

Remarks

Claims 1-21 and 23-29 are now pending in this application. Applicants have amended claims 1, 6, 7, 11, 12, 15-21 and 23-27 and presented claims 28 and 29 to clarify the claimed invention. Applicants respectfully request favorable reconsideration of this application.

Applicants have amended the specification to correct minor typographical errors.

Applicants submit herewith five sheets of corrected drawings in which Applicants have corrected minor errors.

The amended claims are supported by the specification at, among other passages, page 10, line 30, through page 11, line 5; page 13, line 14, through page 14, line 11; page 15, lines 4-7; and Figs. 2 and 9e. The amendments do not represent new matter.

The Examiner rejected claims 1-21 and 23-27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent 6,356,807 to McGee.

McGee does not suggest the invention recited in claims 1-21 and 23-27 since, among other things, McGee does not suggest determining an actual position of a tip of a tool or tool center point. The Examiner recognizes this on page 3 of the office action. McGee only suggests determining a reference frame of a robot. As described at col. 8, lines 33-34, the reference frame appears to be a set of points that define a perimeter or limit of movement of the robot. The

invention recited in claims 1-21 and 23-27 determines or computes an actual position in determining an inaccurate position. The inaccurate position can indicate wear of the tool. Tool wear is very important in spot welding tools.

Additionally, calculating a new frame as describe at col. 9, line 60, through col. 10, line 5, does not suggest measuring or computing an actual position of a tool. This passage describes an alternative embodiment in which a workpiece is moved from an operating space. A tool is then moved from point to point on the workpiece to define a contact surface. This differs from computing an actual position form a distance between two points or positions.

As recited in claim 7, wear may be directly calculated utilizing the actual position. On the other hand, McGee suggests calibration in lateral directions rather than addressing wear to a tool. Along these lines, McGee does not suggest determining a distance between the tool and a surface with the tool oriented normal to the surface. As shown in Figs. 2 and 3, McGee suggests lateral contact between the tool and an opening in a calibration plaque.

The Examiner cites a number of discrete passages of McGee to assert that the claimed invention is obvious. However, these passages are not connected to each other and have nothing to do with each other. For example, “moving the robot assembly from an initial point toward a contact position” described at col. 3, lines 4-21, in the Summary of the Invention section of McGee has no connection to the description at col. 15, lines 4-55. These descriptions are not connected and do not suggest the claimed invention. For example, the invention recited in claim 1 includes bringing the tip of the tool to be moved from a first programmed position, bringing the

tip to collide with the surface at a collision point, and computing the actual position from the distance between the collision and the first programmed position. These steps are connected. On the other hand, the McGee suggests elements that have no logic connection. In fact, the passage at col. 9, line 60, though col. 10, line 4, is described as an alternative embodiment.

Also, McGee only suggests arc welding, where a wire is used. Wear is not an issue in arc welding. Therefore, there would be no reason for McGee to calculate wear. On the other hand, in spot welding, the tool is subjected to constant wear. One skilled in the art would not look to McGee to solve problems related to wear in a tool.

With respect to independent claims 7, 12 and 16, McGee does not suggest a calibration plate as recited in these claims. With respect to claims 12, 16 and 26, McGee does not suggest a level indicator that includes a movably attached plate. The calibration plaque 32 suggested by McGee does not move. The level indicator including a movable attached plate makes it possible to define a contact point and compute distances for a tool including two gun arms, such as a spot welding tool.

The calibration plate also makes it possible to obtain an indication of the bending of gun arms. The gun arms may influence an object to be welded by different pressures and weights by, for example, the movable arm being motor driven. One of the arms may be more sturdy and heavier than the other such that the object moves when the gun arms clamp the object in the closed position. This may also cause bending of the gun arms. The movement may be used to compute the bending of the arms. McGee does not suggest a structure that can provide such

advantages or such advantages.

The invention recited in claims 1-21 and 23-29 can determine a difference between an actual position when a tool is in contact with a surface and a previously defined position for the contact point. The methods recited in claims 1-21 and 23-29 can determine tool wear and as such are particularly useful for use with spot welding guns, which experience tool wear. On the other hand, McGee suggests a method that includes determining contact positions of a robot relative to a workpiece utilizing a sensor that monitors an operating parameter. McGee does not suggest the problem of wear.

In view of the above, the reference relied upon in the office action does not suggest patentable features of the claimed invention. Therefore, the reference relied upon in the office action does not make the claimed invention obvious. Accordingly, Applicant submits that the claimed invention is patentable over the cited references and respectfully requests withdrawal of the rejection based upon the cited reference.

In conclusion, Applicant respectfully requests favorable reconsideration of this case and early issuance of the Notice of Allowance.

If an interview would advance the prosecution of this case, Applicant urges the Examiner to contact the undersigned at the telephone number listed below.

The undersigned authorizes the Commissioner to charge fee insufficiency and credit

overpayment associated with this communication to Deposit Account No. 22-0261.

Respectfully submitted,

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